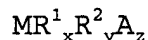


CLAIMS

Having thus described our invention in detail, what we claim is new, and desire to secure by the Letters Patent is:

1. A precursor source mixture comprising at least one precursor compound which is dissolved, emulsified or suspended in an inert liquid, said at least one precursor compound having the formula:



where M is an element selected from the group consisting of Li, Na, K, Rb, Cs, Fr, Be, Mg, Ti, Zr, Hf, Sc, Y, La, V, Nb, Ta, Cr, Mo, W, Mn, Re, Fe, Ru, Os, Co, Rh, Ir, Ni, Pd, Pt, Cu, Ag, Au, Zn, Cd, Hg, B, Al, Ga, In, Tl, Si, Ge, Sn, Pb, As, P, Sb and Bi; R¹ and R² are the same or different ligands selected from the group consisting of hydride, alkyl, alkenyl, cycloalkenyl, aryl, alkyne, carbonyl, amido, imido, hydrazido, phosphido, nitrosyl, nitryl, nitrate, nitrile, halide, azide, alkoxy, siloxy, silyl, and halogenated, sulfonated or silylated derivatives thereof; A is an optional coordinatively bound or associated ligand selected from the group consisting of phosphines, phosphites, amines, arsines, stibenes, ethers, sulfides, nitriles, isonitriles, alkenes, hydrazine, pyridines, nitrogen heterocycles, macrocycles, schiff bases, cycloalkenes, alcohols, phosphine oxides, alkylidenes, nitrites, alkynes, and water; x ≥ 1; x+y = the valence of element M; and z is ≥ 0.

2. The precursor source mixture of Claim 1 wherein said inert liquid is is an aliphatic hydrocarbon, aromatic hydrocarbon, alcohol, ether, aldehyde, ketone, acid, phenol, ester, amine, alkyl nitrile, halogenated

5 hydrocarbon, silylated hydrocarbon, thioether, amine,
6 cyanate, isocyanate, thiocyanate, silicone oil,
7 nitroalkyl, alkyl nitrate, or mixtures thereof.

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1 3. The precursor source mixture of Claim 1 wherein M is
2 Li, Na, K, Rb, Cs, Fr, Be, Mg, Ti, Zr, Hf, Sc, Y, La, V,
3 Nb, Ta, Cr, Mo, W, Mn, Re, Fe, Ru, Os, Co, Rh, Ir, Ni, Pd,
4 Pt, Cu, Ag, Au, Zn, Cd, Hg, B, Al, Ga, In, Tl, Si, Ge, Sn,
5 Pb, As, P, Sb or Bi; R¹ is a hydride; R² is a hydride,
6 alkyl, alkenyl, cycloalkenyl, aryl, alkyne, carbonyl,
7 amido, imido, hydrazido, phosphido, nitrosyl, nitryl,
8 nitrate, nitrile, halide, azide, alkoxy, siloxy, silyl, or
9 halogenated, sulfonated or silylated derivatives thereof;
10 and A is a phosphine, phosphite, aryl, amine, arsine,
11 stibene, ether, sulfide, nitrile, isonitrile, alkene,
12 alkyne, hydrazine, pyridine, nitrogen heterocycle,
13 macrocycle, schiff base, cycloalkene, alcohol, phosphine
14 oxide, alkylidene, nitrite or water.

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1 4. The precursor source mixture of Claim 1 wherein M is
2 Li, Na, K, Rb, Cs, Fr, Be, Ti, Zr, Hf, V, Nb, Ta, Cr, Mo,
3 W, Mn, Re, Fe, Ru, Os, Co, Rh, Ir, Ni, Pd, Cu, Ag, Au, Zn,
4 Cd, Hg, B, Al, Ga, In, Tl, Si, Ge, Sn, Pb, As, Sb or Bi;
5 R¹ is a C₁-C₈ alkyl, or C₄-C₁₂ cycloalkyl; R² is a hydride,
6 alkyl, alkenyl, cycloalkenyl, aryl, alkyne, carbonyl,
7 amido, imido, hydrazido, phosphido, nitrosyl, nitryl,
8 nitrate, nitrile, halide, azide, alkoxy, siloxy, silyl, or
9 halogenated, sulfonated or silylated derivatives thereof;
10 and A is a phosphine, phosphite, aryl, amine, arsine,
11 stibene, ether, sulfide, nitrile, isonitrile, alkene,
12 alkyne, hydrazine, pyridine, nitrogen heterocycle,

13 macrocycle, schiff base, cycloalkene, alcohol, phosphine
14 oxide, alkylidene, nitrite, or water.

1 5. The precursor source mixture of Claim 1 wherein M is
2 Li, Na, K, Rb, Cs, Fr, Be, Ti, Zr, Hf, V, Nb, Ta, Cr, Mo,
3 W, Mn, Re, Fe, Ru, Os, Co, Rh, Ir, Ni, Pd, Cu, Ag, Au, Zn,
4 Cd, Hg, B, Al, Ga, In, Tl, Si, Ge, Sn, Pb, As, Sb or Bi;
5 R¹ is a C₂-C₈ alkenyl, C₄-C₁₂ cycloalkenyl or C₅-C₁₈ aryl; R²
6 is a hydride, alkyl, alkenyl, cycloalkenyl, aryl, alkyne,
7 carbonyl, amido, imido, hydrazido, phosphido, nitrosyl,
8 nitryl, nitrate, nitrile, halide, azide, alkoxy, siloxy,
9 silyl, and/or halogenated, sulfonated or silyated
10 derivatives thereof; and A is a phosphine, phosphite,
11 aryl, amine, arsine, stibene, ether, sulfide, nitrile,
12 isonitrile, alkene, alkyne, hydrazine, pyridine, nitrogen
13 heterocycle, macrocycle, schiff base, cycloalkene,
14 alcohol, phosphine oxide, alkylidene, nitrite, or water.

1 6. The precursor source mixture of Claim 1 wherein M is
2 Li, Na, K, Rb, Cs, Fr, Be, Ti, Zr, Hf, V, Nb, Ta, Cr, Mo,
3 W, Mn, Re, Fe, Ru, Os, Co, Rh, Ir, Ni, Pd, Cu, Ag, Au, Zn,
4 Cd, Hg, B, Al, Ga, In, Tl, Si, Ge, Sn, Pb, As, Sb or Bi;
5 R¹ is a carbonyl; R² is a hydride, alkyl, alkenyl,
6 cycloalkenyl, aryl, alkyne, carbonyl, amido, imido,
7 hydrazido, phosphido, nitrosyl, nitryl, nitrate, nitrile,
8 halide, azide, alkoxy, siloxy, silyl, and/or halogenated,
9 sulfonated or silyated derivatives thereof; and A is a
10 phosphine, phosphite, aryl, amine, arsine, stibene, ether,
11 sulfide, nitrile, isonitrile, alkene, alkyne, hydrazine,
12 pyridine, nitrogen heterocycle, macrocycle, schiff base,
13 cycloalkene, alcohol, phosphine oxide, alkylidene,
14 nitrite, or water.

7. The precursor source mixture of Claim 1 wherein M is Li, Na, K, Rb, Cs, Fr, Be, Ti, Zr, Hf, V, Nb, Ta, Cr, Mo, W, Mn, Re, Fe, Ru, Os, Co, Rh, Ir, Ni, Pd, Cu, Ag, Au, Zn, Cd, Hg, B, Al, Ga, In, Tl, Si, Ge, Sn, Pb, As, Sb or Bi; R¹ is an alkoxy or siloxy; R² is a hydride, alkyl, alkenyl, cycloalkenyl, aryl, alkyne, carbonyl; amido, imido, hydrazido, phosphido, nitrosyl, nitryl, nitrate, nitrile, halide, azide, alkoxy, siloxy, silyl, and/or halogenated, sulfonated or silyated derivatives thereof; and A is a phosphine, phosphite, aryl, amine, arsine, stibene, ether, sulfide, nitrile, isonitrile, alkene, alkyne, hydrazine, pyridine, nitrogen heterocycle, macrocycle, schiff base, cycloalkene, alcohol, phosphine oxide, alkylidene, nitrite, or water.

8. The precursor source mixture of Claim 1 wherein M is Li, Na, K, Rb, Cs, Fr, Be, Ti, Zr, Hf, V, Nb, Ta, Cr, Mo, W, Mn, Re, Fe, Ru, Os, Co, Rh, Ir, Ni, Pd, Cu, Ag, Au, Zn, Cd, Hg, B, Al, Ga, In, Tl, Si, Ge, Sn, Pb, As, Sb or Bi; R¹ is an amide; R² is a hydride, alkyl, alkenyl, cycloalkenyl, aryl, alkyne, carbonyl, amido, imido, hydrazido, phosphido, nitrosyl, nitryl, nitrate, nitrile, halide, azide, alkoxy, siloxy, silyl, and/or halogenated and sulfonated or silyated derivatives thereof; and A is a phosphine, phosphite, aryl, amine, arsine, stibene, ether, sulfide, nitrile, isonitrile, alkene, alkyne, hydrazine, pyridine, nitrogen heterocycle, macrocycle, schiff base, cycloalkene, alcohol, phosphine oxide, alkylidene, nitrite, or water.

9. The precursor source mixture of Claim 1 wherein the precursor compound has the formula $MR^1_x(PR^2_3)_yA_z$ where M is Ti, Zr, Hf, V, Nb, Ta, Cr, Mo, W, Mn, Re, Fe, Ru, Os, Co, Rh, Ir, Ni, Pd, Pt, Cu, Ag or Au, R^1 and R^2 is a ligand selected from the group consisting of hydride, alkyl, alkenyl, cycloalkenyl, aryl, alkyne, carbonyl, amido, imido, hydrazido, phosphido, nitrosyl, nitryl, nitrate, nitrile, halide, azide, alkoxy, siloxy, silyl, and/or halogenated, sulfonated or silylated derivatives thereof; A is an optional coordinatively bound ligand selected from the group consisting of phosphines, phosphites, aryls, amines, arsines, stibenes, ethers, sulfides, nitriles, isonitriles, alkenes, alkynes, hydrazine, pyridines, nitrogen heterocycles, macrocycles, schiff bases, cycloalkenes, alcohols, phosphine oxides, alkylidenes, nitrites and water; $x \geq 1$; $y \geq 0$; z is ≥ 0 ; and $x+y$ = the valence of M.

10. The precursor source mixture of Claim 1 wherein M is Li, Na, K, Rb, Cs, Fr, Be, Mg, Sc, Y, La, Ce, Pr, Nd, Sm, Eu, Gd, Tb, Dy, Ho, Er, Tm, Yb, Lu, Th, Pa, U, Ti, Zr, Hf, V, Nb, Ta, Cr, Mo, W, Mn, Re, Fe, Ru, Os, Co, Rh, Ir, Ni, Pd, Pt, Cu, Ag, Au, Zn, Cd, Hg, B, Al, Ga, In, Tl, Si, Ge, Sn, Pb, As, Sb or Bi; R^1 is a nitrate; R^2 is a hydride, alkyl, alkenyl, cycloalkenyl, aryl, alkyne, carbonyl, amido, imido, hydrazido, phosphido, nitrosyl, nitryl, nitrate, nitrile, halide, azide, alkoxy, siloxy, silyl, or halogenated, sulfonated or silylated derivatives thereof; and A is a phosphine, phosphite, aryl, amine, arsine, stibene, ether, sulfide, nitrile, isonitrile, alkene, alkyne, hydrazine, pyridine, nitrogen heterocycle,

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6 nitriles, isonitriles, alkenes, pyridines, heterocycles,
7 tetrahydrofuran, dimethylformamide, macrocycles, schiff
8 bases, cycloalkenes, alcohols, phosphine oxides and
9 alkynes.

18. The precursor source mixture of Claim 16 wherein the additive is selected from the group consisting of methanol, ethanol, isopropanol, neopentanol, trimethylamine, dimethylethylamine, diethylmethylanine, triethylamine, dimethylamine, diethylamine, bistrimethylsilylamine, ammonia, ethylenediamine, propylenediamine, trimethylethylethylenediamine, triphenylphosphine, triethylphosphine, trimethylphosphine, allyl, cyclopentadiene, benzene, ethylbenzene, toluene, cyclohexadiene, cyclooctadiene, cycloheptatriene, cyclooctatetraene, mesitylene, tetrahydroguran, dimethylformamide, dimethylsulfoxide, butyl acetate, acetic acid, ethylhexanoic acid, methane, ethane, pyridine, and PF_3 .

1 19. The precursor source mixture of Claim 1 wherein the
2 inert liquid is composed of two or more components
3 selected from the group consisting of aliphatic
4 hydrocarbons, aromatic hydrocarbons, alcohols, ethers,
5 aldehydes, ketones, acids, phenols, esters, amines,
6 alkyl nitrile, halogenated hydrocarbons, silylated
7 hydrocarbons, thioethers, amines, cyanates, isocyanates,
8 thiocyanates, silicone oils, nitroalkyl, alkyl nitrate,
9 and/or mixtures of one or more of the above and an
10 additive of no more than 30% by volume of the inert liquid
11 wherein the additive is selected from the group consisting
12 of additional precursor ligand, additional precursor

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1 adduct, and other coordinating compound selected from the
2 group consisting of phosphines, phosphites, aryls, amines,
3 arsines, stibenes, ethers, sulfides, nitriles,
4 isonitriles, alkenes, pyridines, heterocycles,
5 tetrahydrofuran, dimethylformamide, macrocycles, schiff
6 bases, cycloalkenes, alcohols, phosphine oxides, and
7 alkynes.

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1 20. The precursor source mixture of Claim 19 wherein the
2 additive is selected from the group consisting of
3 methanol, ethanol, isopropanol, neopentanol,
4 trimethylamine, dimethylethylamine, diethylmethylamine,
5 triethylamine, dimethylamine, diethylamine,
6 bistrimethylsilylamine, ammonia, ethylenediamine,
7 propylenediamine, trimethylethylethylenediamine,
8 triphenylphosphine, triethylphosphine, trimethylphosphine,
9 allyl, cyclopentadiene, benzene, ethylbenzene, toluene,
10 cyclohexadiene, cyclooctadiene, cycloheptatriene,
11 cyclooctatetraene, mesitylene, tetrahydrofuran,
12 dimethylformamide, dimethylsulfoxide, butyl acetate,
13 acetic acid, ethylhexanoic acid, methane, ethane,
14 pyridine, and PF₃.

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1 21. The precursor source mixture of Claim 1 wherein the
2 inert liquid is composed of C₅-C₁₂ alkane and contains an
3 additive of no more than 30% by volume of the inert liquid
4 wherein the additive is selected from the group consisting
5 of an additional precursor ligand, an additional precursor
6 adduct, or other coordinating compound selected from the
7 group consisting of phosphines, phosphites, aryls, amines,
8 arsines, stibenes, ethers, sulfides, nitriles,
9 isonitriles, alkenes, pyridines, heterocycles,

10 tetrahydrofuran, dimethylformamide, macrocycles, schiff
11 bases, cycloalkenes, alcohols, phosphine oxides, and
12 alkynes.

1 22. The precursor source mixture of Claim 21 wherein the
2 additive is methanol, ethanol, isopropanol, neopentanol,
3 trimethylamine, dimethylethylamine, diethylmethylamine,
4 triethylamine, dimethylamine, diethylamine,
5 bistrimethylsilylamine, ammonia, ethylenediamine,
6 propylenediamine, trimethylethylethylenediamine,
7 triphenylphosphine, triethylphosphine, trimethylphosphine,
8 allyl, cyclopentadiene, benzene, ethylbenzene, toluene,
9 cyclohexadiene, cyclooctadiene, cycloheptatriene,
10 cyclooctatetraene, mesitylene, tetrahydrofuran,
11 dimethylformamide, dimethylsulfoxide, butyl acetate,
12 acetic acid, ethylhexanoic acid, methane, ethane,
13 pyridine, or PF_3 .

1 23. The precursor source mixture of Claim 1 wherein the
2 at least one precursor compound is dimethyl-, diethyl-, or
3 diisobutyl- B, Al, Ga, In, As, or Sb hydride;
4 $Me_2AlH(NEtMe_2)$; tertbutylarsine; $(Me_3N)AlH_3$; $(EtMe_2N)AlH_3$;
5 $(Et_3N)AlH_3$; $CpWN_2$; Cp_2MoH_2 ; trimethyl-, triethyl-,
6 triisobutyl-, tri-n-propyl-, tri-isopropyl-, tri-n-butyl-,
7 trineopentyl-, or ethyldimethyl- B, Al, Ga, In, As or Sb;
8 tetramethyl-, tetraethyl-, tetraphenyl-, or tetra-n-butyl-
9 Si, Ti, Zr, Hf, Ge, Sn, or Pb; dimethyl-, diethyl-, or
10 diisobutyl- B, Al, Ga, In, As or Sb, hydride, chloride,
11 fluoride, bromide, iodide, Cp, amide, dimethylamide or
12 azide; triethyl-, triisobutyl-, tri-n-propyl-, tri-
13 isopropyl-, tri-n-butyl- or ethyldimethyl- B, Al, Ga, In,
14 As or Sb trimethylamine, diethylmethylamine,

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15 dimethylethylamine, or triethylamine; dimethyl- or
16 diethyl- Zn, Cd, or Hg; (neopentyl)₄Cr; Et₃Pb(neopentoxo);
17 Cp₂Me₂Zr; (MeNC)₂PtMe₂; CpIr(C₂H₄)₂; bisCp- Co, Mo, Fe, Mn,
18 Ni, Ru, V, Os, Mg or Cr; bisethylbenzene; bisbenzene-Co,
19 Mo or Cr; triphenyl-Bi, Sb, or As; trivinylboron; trisCp-
20 Sc, Y, La, Ce, Pr, Nd, Sm, Eu, Gd, Tb, D, Ho, Er, Tm, Yb,
21 or Lu; tetraCp-Th, Pa, U, Np, Pu, or Am trisallyliridium;
22 CpCr(CO)₂; Cp₂ZrMe₂; CpCuPEt₃; CpIn; CpIr(cyclooctadiene);
23 CpPd(allyl); CpGaMe₂; CpGaEt₂; (cyclohexadiene)FeCO₃;
24 (cyclooctatetraene)FeCO₃; ethylferrocene; CpMn(CO)₃;
25 (cycloheptatriene) Mo(CO)₃; TlCp; Cp₂WH₂;
26 (mesitylene)W(CO)₃; CpRe(CO)₃; CpRh(CO)₂; Ir(allyl)₃;
27 Pt(allyl)₂; CpIr(cyclooctanedione);
28 [Ir(OMe)(cyclooctanedione)]₂;
29 Ru(cyclooctanedione)(allyl)₂; Ru₃CO₁₂; Fe(CO)₅; Co₂(CO)₈;
30 Ru(CO)₃(1,3-cyclohexadiene); Os₃CO₁₂; Cr(CO)₆; CpCo(CO)₂;
31 Mn₂(CO)₁₀; CpMn(CO)₃; (cycloheptatriene)Mo(CO)₃; Mo(CO)₆;
32 Ni(CO)₄; Re₂(CO)₁₀; CpRe(CO)₃; CpRh(CO)₂; Ru₃(CO)₁₂; W(CO)₆;
33 CpV(CO)₄; CF₃Co(CO)₄; Pt(CO)₂(cyclooctanedione);
34 Ir(CO)₂(cyclooctanedione); (CO)₄Fe[P(OCH₃)₃];
35 (CO)₄Fe[N(CH₃)₃]; CoNO(CO)₃; butoxy, OCH(CF₃)₂, OCMe₂(CF₃),
36 OCMe(CF₃)₂, OSi(CH₃)₃, OC(CH₃)₃, OC(SiMe₃)₃, or OC(CF₃)₃ Li,
37 Na, K, Rb, Cs, Fr, Cu, Ag, Au, Hg, or Tl; tetra-methoxy,
38 tetra-ethoxy, tetra-isopropoxy, tetra-butoxy, tetra-tert-
39 butoxy, tetra-isobutoxy, tetra-OCH(CF₃)₂, tetra-OCMe₂(CF₃),
40 tetra-OCMe(CF₃)₂, tetra-OC(CH₃)₃, tetra-OC(SiMe₃)₃, tetra-
41 OC(CF₃)₃ or tetra-OSi(CH₃)₃ Si, Ge, Sn, Pb, Ti, Zr, or Hf;
42 VO(isopropoxy)₃, tri-isopropoxy, tri-sec-butoxy, tri-
43 n-butoxy, tri-iso-butoxy, tri-methoxy, tri-ethoxy, tri-
44 OCH(CF₃)₂, tri-OCMe₂(CF₃), tri-OCMe(CF₃)₂, tri-OC(CH₃)₃, tri-
45 OC(SiMe₃)₃, tri-OC(CF₃)₃, or tri-OSi(CH₃)₃, B, Al, Ga, In,
46 P, As, or Sb; Et₃Pb(isopropoxide); (tertbutoxy)CuPMe₃;

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47 tetrakis(dimethylamino), tetrakis(diethylamino) Ti, Zr,
48 Hf, Si, Ge, Sn, or Pb; diethylaminodiethylarsine;
49 diethylaminoarsine dichloride; bisdimethylaminoarsine
50 chloride; $\text{Me}_2\text{Zn}(\text{triethylamine})_2$;
51 diethylaminodimethylstannane; tris(dimethylamino)
52 phosphine; tris(dimethylamino) antimony;
53 tris(dimethylamino) arsine; tris(dimethylamino) stibine;
54 tris-bis(trimethylsilyl)erbium amide;
55 bis(dimethylamino)(trimethylethylenediamino)
56 aluminium; $(\text{CO})_4\text{Fe}[\text{N}(\text{CH}_3)_2]$, Li, Na, or $\text{K N}(\text{SiMe}_3)$,
57 pentadimethylaminotantalum; diethylaminodimethyltin;
58 hexadimethylaminoditungsten;
59 trisdimethylamino(trimethylethylenediamino)titanium;
60 $\text{CpCu}(\text{PEt}_3)$; $\text{CpCu}(\text{triphenylphosphine})$; (tertbutoxy) CuPMe_3 ;
61 $\text{Pt}(\text{PF}_3)_4$; $\text{Ni}(\text{PF}_3)_4$; $\text{Cr}(\text{PF}_3)_6$; $(\text{Et}_3\text{P})_3\text{Mo}(\text{CO})_3$; $\text{Ir}(\text{PF}_3)_4$;
62 $\text{Ti}(\text{NO}_3)_4$; $\text{Zr}(\text{NO}_3)_4$; $\text{Hf}(\text{NO}_3)_4$; $\text{Si}(\text{CH}_3)_3(\text{NO}_3)$; $\text{RuNO}(\text{NO}_3)_3$;
63 gallium nitrate; $\text{Sn}(\text{NO}_3)_4$; $\text{Co}(\text{NO}_3)_3$; $\text{VO}(\text{NO}_3)_3$; $\text{CrO}_2(\text{NO}_3)_2$;
64 TiCl_4 ; ZnCl_2 ; ZrCl_4 ; HfCl_4 ; AlCl_3 ; SiCl_4 ; GaCl_3 ; SnCl_4 ;
65 CoCl_3 ; dimethyl, diethyl, or diisobutyl, Al, B, Ge, Si, or
66 As halide; $\text{N}(\text{SiMe}_3)_2$ Li, Na, or K; $\text{B}(\text{CH}_2\text{SiMe}_3)_3$; $\{(\text{Me}_3\text{Si})_2\text{N}\}_3$
67 B, Al, Ga or In; $(\text{Me}_3\text{SiCH}_2)_4\text{Ti}$, Zr or Hf; or $\{(\text{Me}_3\text{Si})_2\text{N}\}_2$
68 Zn, Cd or Hg, where Cp is cyclopentadienyl.

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24. A method for chemical vapor deposition or atomic layer
deposition comprising: vaporizing the precursor compound
in the precursor source mixture of Claim 1, introducing
the vaporized precursor into a chemical vapor deposition
or atomic layer deposition reactor with optional addition
of other co-reactant(s), and depositing a constituent of
the vaporized precursor on a substrate to form a film.

1 25. The method of Claim 24 wherein said film is a
2 component in an electronic device.

1 26. The method of Claim 24 wherein said co-reactant(s) is
2 introduced separately from said vaporized precursor.

1 27. The method of Claim 24 comprising vaporizing the
2 precursor in the precursor source mixture, and introducing
3 the vaporized precursor into an atomic layer deposition
4 reactor with separate addition of other co-reactant(s) and
5 inert purge gas and depositing a film on a substrate by
6 sequential introduction of alternating pulses of vaporized
7 precursor(s), purge gas, co-reactant(s) and purge gas.

1 28. The method of Claim 24 wherein the co-reactant is a
2 reducing agent, an oxidizing agent, a nitriding agent or a
3 silyating agent.

1 29. The method of Claim 28 wherein said reducing agent is
2 selected from the group consisting of hydrogen, forming
3 gas, silane, and combinations thereof.

1 30. The method of Claim 28 wherein said oxidizing agent is
2 selected from the group consisting of oxygen, ozone,
3 water, hydrogen peroxide, nitrous oxide, and combinations
4 thereof.

1 31. The method of Claim 28 wherein said nitriding agent is
2 selected from the group consisting of ammonia, hydrazine,
3 hydrogen azide, tertbutylamine, isopropylamine, and
4 combinations thereof.

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44. The method of Claim 41 wherein the plug material is selected from the group consisting of polysilicon, W, Mo, Ti, Cr, Cu, and doped or undoped alloys, mixtures and multilayers thereof.

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1 45. The method of Claim 41 wherein the conductive barrier
2 is selected from the group consisting of TaN, TaSiN,
3 TiAlN, TiSiN, TaSiN, TaWN, TiWN, TaSiN, TaAlN, NbN, ZrN,
4 TaTiN, TiSiN, TiAlN, IrO_x, Os, OsO_x, MoSi, TiSi, ReO₂, and
5 doped or undoped alloys, mixtures and multilayers thereof.

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1 46. The method of Claim 41 wherein the bottom electrode
2 is selected from the group consisting of conductive
3 materials, polysilicon, Ni, Pd, Pt, Cu, Ag, Au, Ru, Ir,
4 Rh, OrO_x, TaN, TaSiN, Ta, SrRuO₃, LaSrCoO₃, and doped or
5 undoped alloys, mixtures and multilayers thereof.

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1 47. The method of Claim 41 wherein the dielectric
2 material is selected from the group consisting of SiO₂,
3 SiO_xN_y, Si₃N₄, Ta₂O₅, TiO₂, ZrO₂, HfO₂, Al₂O₃, La₂O₃, Y₂O₃,
4 multicomponent metal oxides, perovskite type oxide having
5 the formula ABO₃ wherein B is at least one acid oxide
6 containing a metal selected from the group consisting of
7 Al, Ti, Zr, Hf, V, Nb, Ta, Cr, Mo, W and Cu, and A is at
8 least one additional cation having a positive formal
9 charge of from about 1 to about 3, barium strontium
10 titanate, barium strontium zirconate, barium strontium
11 hafnate, lead titanate, yttrium aluminate, lanthanum
12 aluminate, lead zirconium titanate, strontium bismuth
13 tantalate, strontium bismuth niobate, bismuth titanate,
14 lanthanum silicate, yttrium silicate, hafnium silicate,
15 zirconium silicate, rare earth doped silicates and doped
16 or undoped alloys, mixtures and multilayers thereof.

1 48. The method of Claim 41 wherein the top electrode is
2 selected from the group consisting of polysilicon, Ni, Pd,
3 Pt, Cu, Ag, Au, Ru, Ir, Rh, IrO_x, TaN, TaSiN, Ta, SrRuO₃,

LaSrCoO₃, and doped or undoped alloys, mixtures and multilayers thereof.

49. A method of fabricating a wiring structure composed of etched trenches and vias into a dielectric layer, optional barrier material between dielectric and wiring material, and wiring material wherein at least one component of the wiring structure is deposited according to Claim 24.

50. The method of Claim 49 wherein the dielectric layer is selected from the group consisting of SiO₂, SiO_xN_y, Si₃N₄, phosphosilicate glass, metal oxides, Al₂O₃ and doped or undoped alloys, mixtures and multilayers thereof.

51. The method of Claim 49 wherein the optional barrier material is selected from the group consisting of WN, TiN, TaN, SiO₂, SiO_xN_y, Si₃N₄, phosphosilicate glass, metal oxides, Al₂O₃, and doped or undoped alloys, mixtures and multilayers thereof.

52. The method of Claim 49 wherein the wiring material is selected from the group consisting of polysilicon, Al, W, Mo, Ti, Cr, Cu and doped or undoped alloys, mixtures and multilayers thereof.

53. A method of fabricating an electronic device composed of a substrate having source and drain regions and a channel region between said source and drain regions, a gate dielectric, aligned to and on top of said channel region, and a gate electrode aligned to and on top of said

6 gate dielectric wherein at least one component of the
7 electronic device is deposited according to Claim 24.

d 54 1 53. A method of Claim 53 wherein the gate dielectric
2 selected from the group consisting of SiO_2 , SiO_xN_y , Si_3N_4 ,
3 Ta_2O_5 , TiO_2 , ZrO_2 , HfO_2 , Al_2O_3 , La_2O_3 , Y_2O_3 , multicomponent
4 metal oxides, perovskite type oxide having the formula
5 ABO_3 wherein B is at least one acid oxide containing a
6 metal selected from the group consisting of Al, Ti, Zr,
7 Hf, V, Nb, Ta, Cr, Mo, W and Cu, and A is at least one
8 additional cation having a positive formal charge of from
9 about 1 to about 3, barium strontium titanate, barium
10 strontium zirconate, barium strontium hafnate, lead
11 titanate, yttrium aluminate, lanthanum aluminate, lead
12 zirconium titanate, strontium bismuth tantalate, strontium
13 bismuth niobate, bismuth titanate, lanthanum silicate,
14 yttrium silicate, hafnium silicate, zirconium silicate,
15 rare earth doped silicates and doped or undoped alloys,
16 mixtures and multilayers thereof.

1 55. The method of Claim 53 wherein gate dielectric is
2 composed of more than one layer.

1 56. The method of Claim 53 wherein the gate electrode is
2 selected from the group consisting of polysilicon, Al, Ag,
3 Bi, Cd, Fe, Ga, Hf, In, Mn, Nb, Y, Zr, Ni, Pt, Be, Ir, Te,
4 Re, Rh, W, Mo, Cr, Fe, Pd, Au, Rh, Ti, Cr, Cu, and doped
5 or undoped alloys, mixtures and multilayers thereof.

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